

TYPHOON FORREST (18W)

Typhoon Forrest was the second tropical cyclone to begin east of the dateline and move westward into the western North Pacific. Forrest was a classic recurver and a small, compact system. The track and intensities were well forecast with the exception of the intensities being a little low through the first half of Forrest's life. An interesting point to note about this system is that the upper-level vortex appeared to develop first and then built downward to the surface. Post-analysis of synoptic and aircraft reconnaissance data indicates the stronger upper- and mid-level winds did not begin to reach the surface until after the 14th of October.

On 9 October, personnel at Detachment 1, 1st Weather Wing, Satellite Operations first detected Forrest on satellite imagery as an area of poorly organized convection in the trade wind trough 600 nm (1111 km) east of the Marshall Islands. Over the next 18-hours the convection began to slowly increase in organization. Once across the dateline, it was first discussed on the Significant Tropical Weather Advisory (ABPW PGIW) at 100600Z. At that stage, the amount of convection began to decrease, but a small cyclonic vorticity center remained. Over the next 48-hours, Forrest remained in a region where the upper-level environment was unfavorable for

development. As a result, it remained poorly organized and continued moving west-northwestward. Sparse synoptic data indicated the minimum sea-level pressure (MSLP) was approximately 1008 mb and the maximum sustained surface winds were 10 to 20 kt (5 to 10 m/sec).

The orientation of low-level clouds on the visual satellite imagery at 120000Z revealed a broad circulation center in the western quadrant of deep convection located 320 nm (593 km) east of the Bikini Atoll in the Marshall Island Group. The intensity was estimated to be 25 kt (13 m/sec). Later, at 121800Z, Forrest demonstrated continued growth. This prompted reissuance of the ABPW PGIW at 122000Z to upgrade Forrest's potential for development to fair. This trend towards increased organization (Figure 3-18-1) continued and resulted in a Tropical Cyclone Formation Alert (TCFA) at 132000Z. The first aircraft reconnaissance investigative mission flown into the disturbance on the 14th of October found multiple low-level circulation centers, a MSLP of 1008 mb, maximum winds of 10 to 25 kt (5 to 13 m/sec) near the vortices and 30 kt (15 m/sec) displaced to the north. The TCFA was reissued at 142000Z, since supporting data did not, as yet, necessitate a warning.

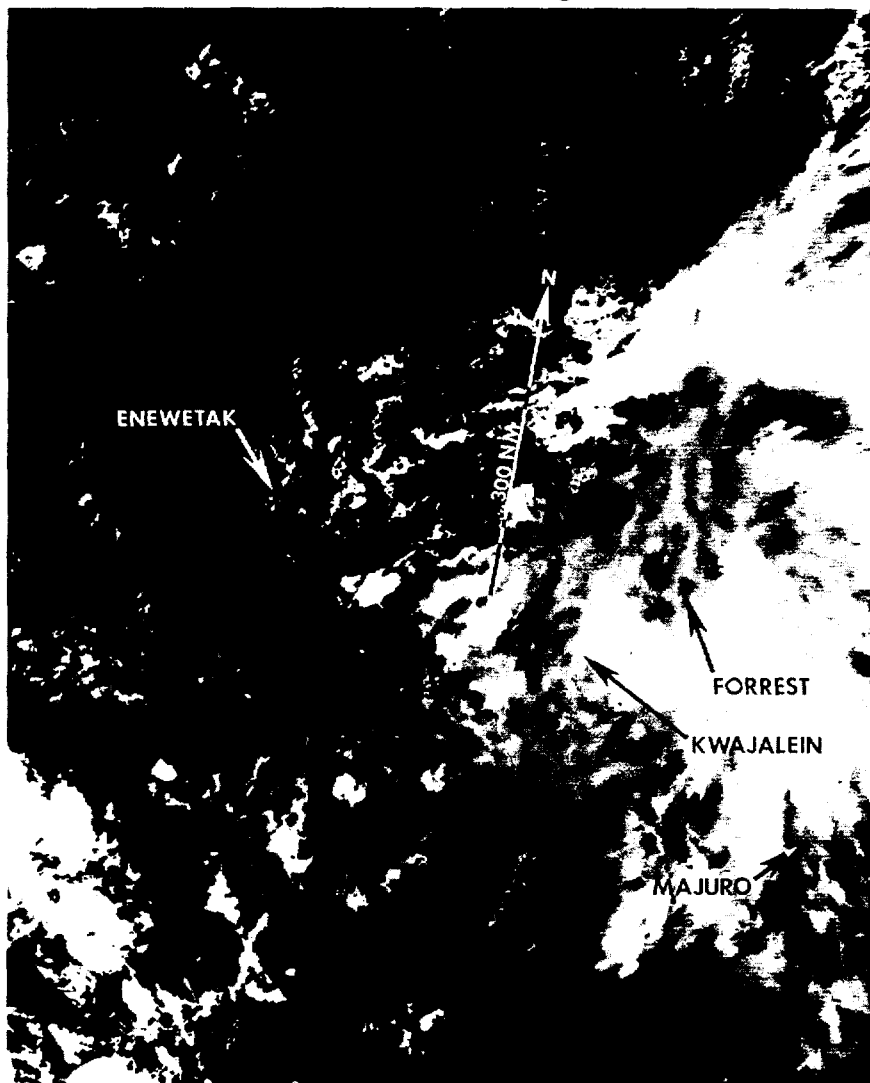


Figure 3-18-1. Typhoon Forrest organizing over the Marshall Islands (122311Z October DMSP visual imagery).

Aircraft reconnaissance on the 15th found a single circulation center; the MSLP had dropped to 1002 mb and maximum winds were 25 kt (13 m/sec). The (Dvorak) satellite intensity estimate at 151600Z of 45 kt (23 m/sec) prompted the first warning. The warning at 151800Z for Tropical Depression 18W, however, only mentioned maximum sustained winds of 30 kt (15 m/sec). The lower intensity on the warning was caused by the Typhoon Duty Officer placing more weight on the earlier aircraft reconnaissance information than the Dvorak analysis of infrared satellite imagery. Subsequent aircraft reconnaissance at 152126Z, however, proved otherwise. They reported maximum winds to be 55 kt (28 m/sec) with a MSLP of 988 mb and a closed, but thin, eyewall. At 160009Z, the aircraft observed 80 kt (41 m/sec). Figure 3-18-2 shows the stronger winds in the north semicircle of Forrest indicative of the tighter pressure gradient between the low pressure center and the subtropical ridge. The 160000Z warning upgraded Forrest from tropical depression to

typhoon intensity with maximum sustained surface winds of 65 kt (33 m/sec). In retrospect, the initial warning was too conservative and the forecasters had waited too long for the aircraft reconnaissance to confirm the strong development indicated by the satellite data.

While moving northwestward at 16 to 18 kt (30 to 33 km/hr) over the next 24-hours, Forrest rapidly deepened. Nighttime aircraft reconnaissance on the 16th indicated Forrest had continued to deepen rapidly as the 700 mb heights fell 70 meters in less than three hours. Dvorak intensity estimate on satellite imagery at 161600Z indicated Forrest contained winds of 102 kt (53 m/sec). By 162105Z the 700 mb heights had dropped by 219 meters from 2840 meters to 2621 meters. The MSLP was 946 mb. Satellite imagery and aircraft intensities were in agreement, that Forrest had deepened rapidly over a very short time period. Forrest peaked at its maximum intensity of 100 kt (51 m/sec) at 170000Z (Figure 3-18-3). Two hours before this peak

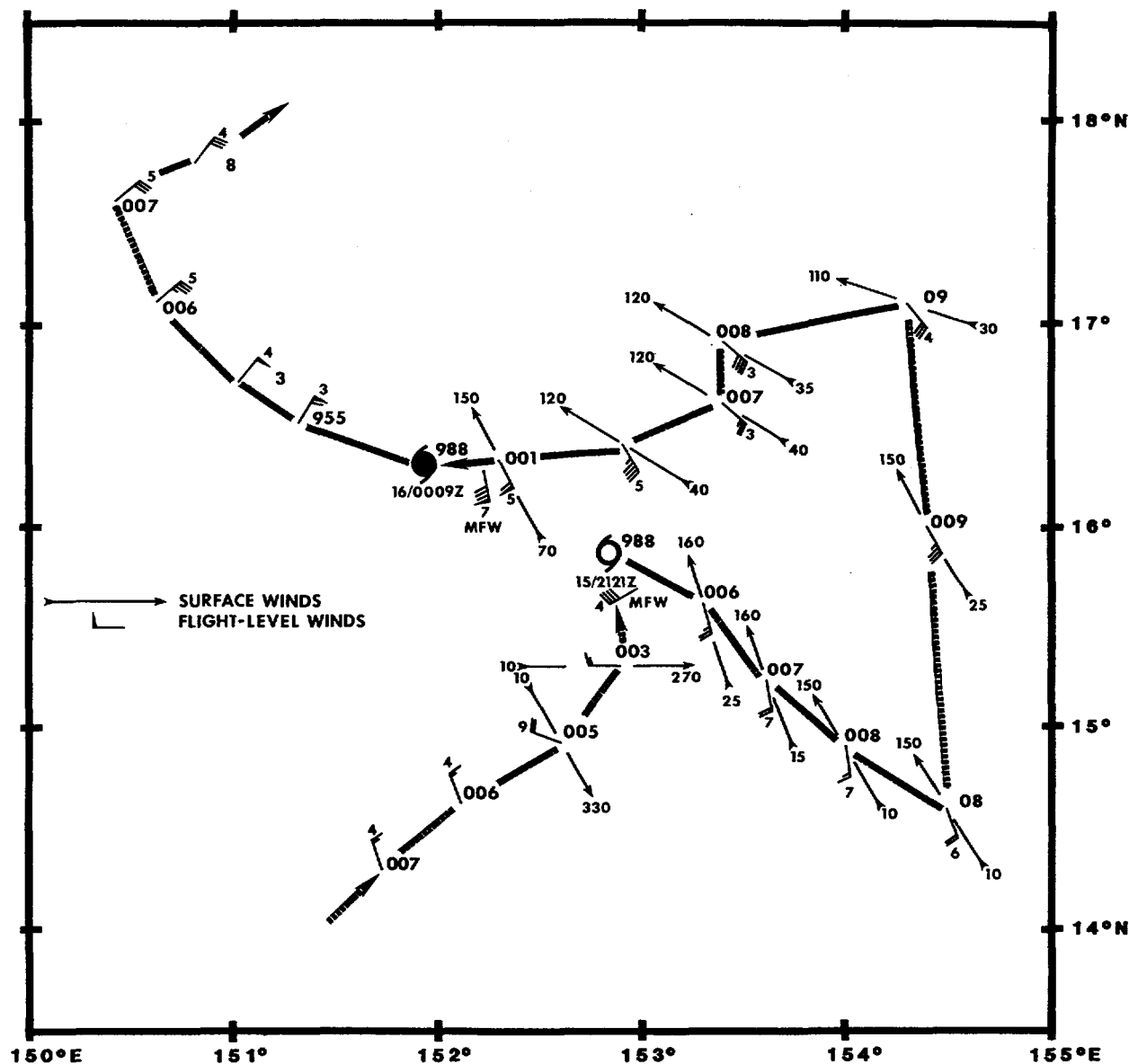


Figure 3-18-2. Plot of aircraft reconnaissance data from 152126Z to 160009Z October showing higher wind speeds to the north and east of the cyclone center. "MFW" represents the maximum observed flight-level winds and "MSW" represents the maximum observed surface winds.

Figure 3-18-3. Typhoon Forrest at maximum intensity of 100 kt (51 m/sec) with a small eye. With the sun low in the east, the cloud top topography is striking (162029Z October DMSP visual imagery).

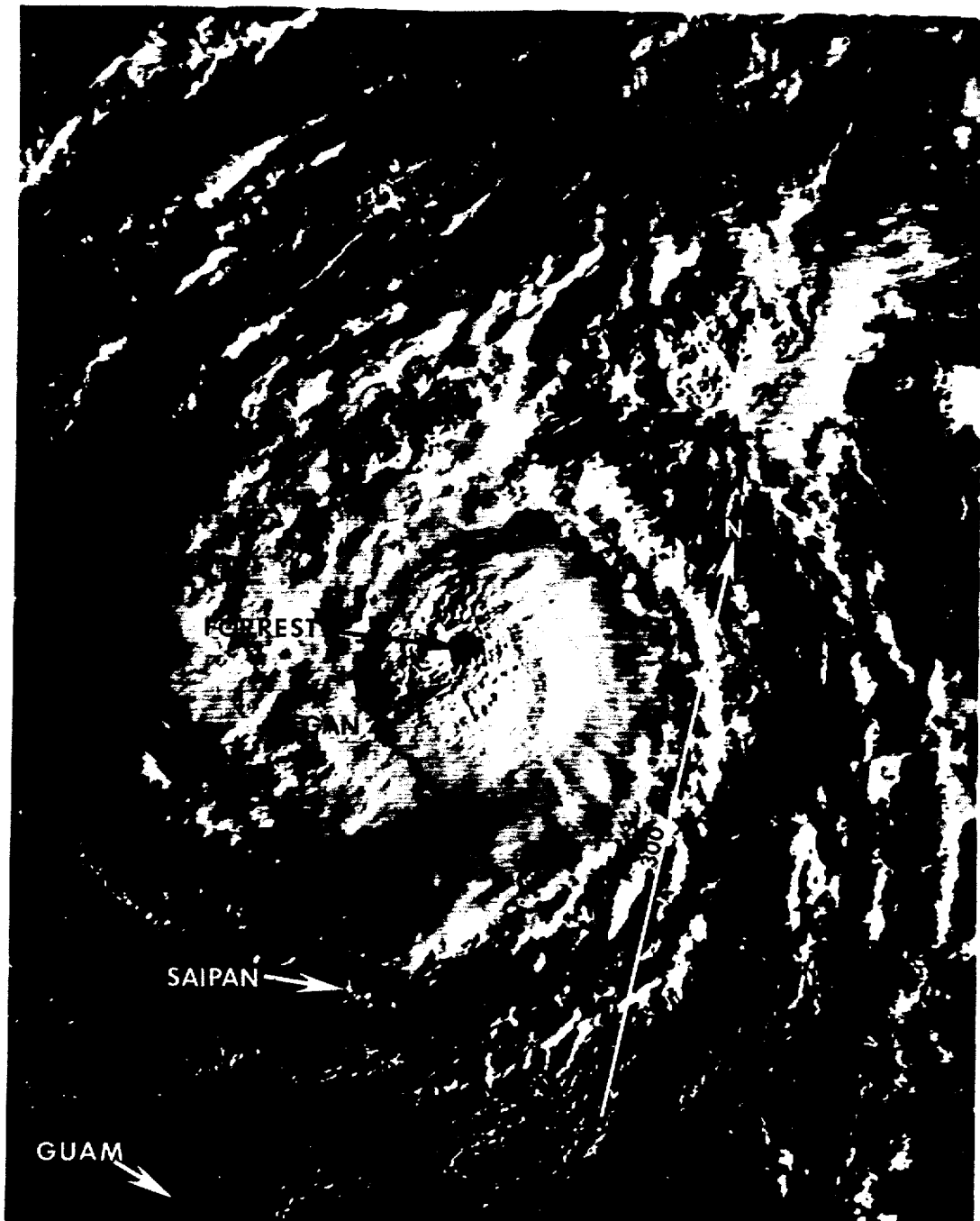


Figure 3-18-4. The thin cirrus clouds in the west semicircle indicate the beginning of the end for Forrest as it was becoming influenced by the stronger mid- to upper-level westerly flow. A short time later, Forrest began to move rapidly northeastward (180536Z October NOAA infrared imagery).



intensity, the island of Agrihan (located in the northern Marianas 270 nm (500 km) north of Guam) bore the brunt of Typhoon Forrest as it passed 10 nm (19 km) to the south. Fortunately, the island's 25 residents received no injuries even though only one building was left standing and two-way communications were destroyed. On the 21st of October, the Navy and Coast Guard joined forces and airlifted 1000 pounds of canned food, medical supplies and a two-way radio to the islanders.

At maximum intensity and just prior to recurvature, Forrest started elongating southwest to northeast and slowed to 5 kt (9 km/hr). JTWC had been expecting Forrest to recurve due to the break in the ridge since the first warnings on the system. The dynamic forecast aids were also in good agreement

in this regard. The One-Way Interactive Tropical Cyclone Model (OTCM) provided the best guidance for speed and the Nested Tropical Cyclone Model (NTCM) had the best handle on direction.

Over the next 30-hours, Forrest began to very gradually weaken as it moved slowly around the western end of the subtropical ridge and started moving northeastward. Figure 3-18-4 shows Forrest's outflow restricted to the west due to the increasing westerlies aloft. By 191200Z, the system was beginning to accelerate northeastward at 23 kt (43 km/hr). Forrest completed transition to an extratropical cyclone and the final warning, indicating 55 kt (28 m/sec) intensity, was issued at 200600Z.